Researchers study how weather news impacts public transit ridership

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If the words in a weather forecast, such as "cool," "sunny" or "windy," can influence the way you dress for the day—can they also influence whether or not you take public transit?

In new research published in *Vehicles*, U researchers found a correlation between words used in media coverage related to weather or air quality,

and transit ridership. It's not enough yet to say that media coverage causes changes in ridership, say authors Tabitha Benney and Daniel Mendoza. But it's enough to explore what factors in to a person's decision to ride transit and whether that decision can be nudged.

"This is encouraging," Benney says. "There's a lot of potential in terms of reaching a lot of different actors that could have a big influence or encourage ridership."

Scanning the media

Mendoza, a research assistant professor in the Department of Atmospheric Sciences and visiting assistant professor in the Department of City & Metropolitan Planning, previously studied how transit ridership along the Wasatch Front, on the buses and trains of the Utah Transit Authority (UTA), impacted air quality. The impact is greater when more people are riding since low-ridership trips, particularly on older buses, can actually have a net contribution to air pollution.

Around the same time Tabitha Benney, an associate professor in the Department of Political Science, was looking at surveys of Utahns that included their reasons for using transit or not. "We were surprised at some of the responses," she says, "and that led me to pursue asking questions about what matters in terms of what could be in the media or how it could be influencing people."

So Mendoza and Benney, along with co-authors Martin Buchert and John Lin, looked at how media coverage of the weather and air quality correlated with transit ridership. For the years 2014-2016, they scanned 40 local Utah media outlets for words related to weather (such as "cloudy," "freezing," or "summer"), air quality (red, yellow or green air day, according to the state's color-coded air quality system) and air pollution (such as "ozone," "PM2.5" or "particulate matter"). Then they

looked at the transit ridership the day after the media coverage and noted the actual air quality of that day.

"We wanted to ask if there are any additional factors that would encourage or discourage ridership," Mendoza says.

Comfort and safety

UTA has three main modes of transportation: buses, light rail (TRAX) and commuter rail (FrontRunner). FrontRunner riders tend to ride for farther distances, and their rider behavior, the authors found, didn't vary much with media terms. The most variation, they found, was in bus ridership.

Within that variation, a few media terms related to weather stood out. On average, more usage of the term "good weather" was correlated with more ridership the following day. Similarly, more usage of "winter" was associated with increased ridership, but that may be related to the seasonal nature of U students, the authors say, as the U is the single largest paid pass purchaser from UTA.

Few UTA bus stops have a weather shelter, Mendoza says (although UTA has added more shelters in recent years). Media reports of bad weather, he suggests, could discourage bus ridership.

When looking at color-coded air quality terms, the researchers found less ridership on the bus system on days following use of "orange air day" and "red air day." That could be due to non-commuter bus users who ride the bus for discretionary transportation choosing to stay home to avoid poor air quality and the cold temperatures that typically accompany poor air quality days.

"Ridership is associated with favorable weather conditions and air

quality," the authors wrote, "suggesting that ridership volume may be influenced by an overall sense of comfort and safety."

They also found that less technical terms, such as "particulate matter" instead of "PM2.5," were correlated with greater changes in ridership. Same with the color-coded "red air day" term.

"That kind of surprised us," Benney says. Another surprise was the finding that reports of bad air quality reduced ridership, and that reports of good air quality didn't boost it.

"You would expect a strong relationship to clean air with people wanting to move in that direction," she says. "And that's obviously significant."

Moving the needle

Benney says that the study focused on web-accessible media outlets and did not take into account social media, which could have a significant influence on younger audiences, who tend to ride buses more. Upcoming work, she says, will look closer at the sources of Utahns' information about weather and air quality, including from religious services.

The study is encouraging, she adds, because it suggests that messages may be able to influence day-to-day rider behavior. "This opens up a lot of opportunities for large institutional actors to help promote better air quality through ridership," she says.

And the impact has already begun. The Utah Legislature passed a bill in 2019 that launched a three-year pilot program to provide free fares on UTA transit on poor air quality days. Preliminary findings from this research, Mendoza says, provided part of the bill's supporting scientific basis.

Additionally, he says, some of the largest employers in the Salt Lake Valley, including the University of Utah, may be able to use these findings to effectively encourage employees to make air-friendly choices through riding transit or choosing to telework. "And now we're all getting really used to telework!" he says. "Because of that we can actually start to potentially move the needle by reducing the vehicular traffic."

More information: Daniel L. Mendoza et al, The Association of Media and Environmental Variables with Transit Ridership, *Vehicles* (2020). DOI: 10.3390/vehicles2030028

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